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TWO RECENT PLANT DISCOVERIES IN MISSOURI: *CLADIUM MARISCUS* SUBSP. *JAMAICENSE* (CYPERACEAE) AND *UTRICULARIA MINOR* (LENTIBULARIACEAE)

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ABSTRACT

Here we report the first Missouri records for *Cladium mariscus* (L.) Pohl subsp. *jamaicense* (Crantz) Kük. (Cyperaceae) and *Utricularia minor* L. (Lentibulariaceae). Both taxa are documented from The Nature Conservancy's Shut-in Mountain Fens Preserve in Shannon County, within the Ozark Highlands ecoregion of southeastern Missouri.

KEY WORDS: Cyperaceae, Lentibulariaceae, *Cladium*, *Utricularia*, Missouri, Shannon County

Shut-in Mountain Fens Preserve is a 520-acre (210 ha) Nature Conservancy preserve characterized by rugged igneous knobs of Precambrian rhyolitic ash flows overlain by deep beds of dissected Ordovician dolomite. Below the small exposed igneous glade at the summit of Shut-in Mountain, the site is primarily oak-hickory woodland, with a minor component of shortleaf pine (*Pinus echinata*). Total relief within the preserve is 100 meters. The geology and topography create several areas of permanent minerotrophic groundwater discharge along Wildcat Hollow, the small, northeast-trending, intermittently flowing drainage that passes through the site. These phreatic discharges range from numerous small seepage areas of a few square meters to three fens ranging up to 1.0 ac (0.4 ha). The vegetation of these fen areas is briefly described below; data on dominant vascular plants are from Ladd (2010).

The central fen in this complex is categorized as Ozark Fen by Nelson (2010), and supports a rich assemblage of plants whose Ozark distribution is restricted to fen systems. Dominant plant species in this fen are *Rudbeckia fulgida* var. *umbrosa*, *Parnassia grandiflora*, *Scleria verticillata*, *Vernonia missurica*, and *Oxypolis rigidior*.

A few hundred meters upstream (west) from this fen is an unusual fen area characterized by an expanse of seeping marly gravel over dolomite bedrock. While this site likely supported Ozark fen historically, past land use history of this area has resulted in the loss of virtually all organic substrate, creating an unusual minerotrophic wetland dominated by a sparse cohort of *Rhynchospora capillacea*, *Physostegia virginiana*, *Silphium terebinthinaceum*, *Panicum virgatum*, and *Fuirena simplex*.

The easternmost fen has strong biological affinities to dolomite glade, and consists of a ca. 0.5 ac (0.2 ha) gently sloping open seepage over surfacing flats of dolomite bedrock. Dominant plant species here are *Scleria verticillata*, *Schizachyrium scoparium*, *Rudbeckia missouriensis*, *Rhynchospora capillacea*, *Linum floridanum*, and *Panicum virgatum*.

Shortly after The Nature Conservancy acquired the site in 1988, a regime of frequent dormant season fires was implemented in much of the preserve. The drainage containing the three fens has been burned 17 times since its acquisition by the Conservancy. This fire management has increased botanical diversity within the fen. Of particular note, the second-known and largest population of *Pogonia ophioglossoides* in Missouri emerged following application of prescribed fire. Several plant taxa of conservation concern or taxa previously unknown in the state have been documented at the site including *Equisetum* × *nelsonii*, *Ludwigia microcarpa*, *Scleria verticillata*, and *Utricularia subulata*.

Cladium mariscus* subsp. *jamaicense

Since 2007, representatives from The Nature Conservancy have observed a slowly increasing vegetative population of a large sedge along the upper margin of the easternmost fen; this was subsequently identified as *Cladium mariscus* (L.) Pohl subsp. *jamaicense* (Crantz) Kük. by the authors. As of 2011, this population had grown to a dense stand of several thousand stems dominating an area measuring approximately 18 × 7 meters. In 2010, only two fertile culms from the previous growing season were located; a few fertile stems were also documented in 2011. Associated plant species include: *Andropogon gerardii*, *Apios americana*, *Eupatorium perfoliatum*, *Fuirena simplex*, *Helenium autumnale*, *Liatris pycnostachya*, *Lysimachia quadriflora*, *Oxypolis rigidior*, *Panicum virgatum*, *Pycnanthemum virginianum*, *Rhynchospora capillacea*, *Rudbeckia fulgida* var. *umbrosa*, *Salix caroliniana*, *Sorghastrum nutans*, *Symphyotrichum lateriflorum*, and *Vernonia missurica*.

Voucher specimens: **MISSOURI. Shannon Co.**: The Nature Conservancy's Shut-in Mountain Fens Preserve, along the south side of Shannon County H-522, ca. 1.4 mi NE of the jct of hwys H and NN, ca. 7.5 mi E of Eminence; large, mostly vegetative colony in partial shade along upper side of easternmost fen, in gently sloping gravelly/marly seepage with exposed dolomite bedrock; 37° 06' 35.82"N, 91° 13' 39.35"W, 21 Apr 2010, *Thomas 2349* (MO); 24 August 2011. *Ladd 32234* (KANU, MO).

This is the northwesternmost, though not westernmost, record of *Cladium mariscus* subsp. *jamaicense*, and represents a significant range extension as well as the first record for Missouri. This species is dominant in marshes of the Florida Everglades (Tucker 2002), and it occurs primarily in coastal marshes from Virginia to Texas and also in Hawaii (Tucker 2002; BONAP 2012). Additional inland populations in the United States have been reported from Georgia, Arkansas, Texas, and New Mexico (NatureServe 2010; USDA, NRCS 2010; T. Witsell, personal communication, 15 November 2010; BONAP 2012). *Cladium mariscus* subsp. *jamaicense* is also known from Mexico, the West Indies, Central America, and northern South America (Tucker 2002). The Missouri population of *C. mariscus* subsp. *jamaicense* is more than 400 km north of the closest documented sites in southern Arkansas (Tucker 2002; T. Witsell personal communication, 15 November 2010; NatureServe 2010; USDA, NRCS 2010; BONAP 2012).

Figure 1. *Cladium mariscus* ssp. *jamaicense* at Shut-in Mountain Fens Preserve. Photograph by Justin Thomas.

In North America, *Cladium mariscus* subsp. *jamaicense* typically occurs in brackish and freshwater marshes (Tucker 2002). However, the Missouri population occurs on the margin of a marly fen. The precedent to occur in minerotrophic fen wetlands is not unexpected; the Old World counterpart to our taxon, the questionably distinct var. *mariscus*, is a dominant species in calcareous fens in Europe (EUNIS Biodiversity Database 2012), where the common name for the plant is "Great Fen Sedge."

Only three species of *Cladium* occur in North America — *C. californicum*, *C. mariscoides*, and *C. mariscus* subsp. *jamaicense*. *Cladium mariscus* subsp. *jamaicense* and *C. californicum* differ from *C. mariscoides* in having taller and broader culms, broader leaves with serrate margins, and taller inflorescences with a greater degree of branching (Tucker 2002). *Cladium mariscus* subsp. *jamaicense* is questionably distinct from *C. californicum*, and reportedly differs in having spikelets in smaller groups, inflorescences with third and fourth order branches, and taller culms (Tucker 2002). For a key and a full description of these taxa, see Tucker (2002).

The nativity and ecological status of the Missouri population of *Cladium mariscus* ssp. *jamaicense* is uncertain. There is strong reason to suspect that this population is a recent introduction, as evidenced by its occurrence well outside the previously documented range, its recent discovery in a well-investigated site visited annually by botanists, its proximity to a road, and its steadily increasing population at a single locus in the area. On the other hand, the species is not cultivated, and it is not considered to be ecologically opportunistic or weedy. The continued discovery of conservative native vascular plant taxa at Shut-in Mountain Fens Preserve also raises the slight possibility that habitat management at this site has resulted in the resurgence of a relict population of *C. mariscus* ssp. *jamaicense*.

Utricularia minor

In April 2010 the authors also documented extensive populations of *Utricularia minor* L. from shallowly inundated marly substrate in all three fen communities within Shut-in Mountain Fens Preserve. A subsequent survey of the three fen openings revealed 385 flowering stems in both marl-dominated openings and in the pools of deep muck zones. Plants were common in areas of permanent inundation that lacked visible flow. Though no other species of vascular plants were detected in the immediate microhabitat of the *U. minor* plants, the tussocks and higher (saturated but

not inundated) ground contained such species as: *Rhynchospora capillacea*, *Carex leptalea*, *Panicum virgatum*, *Carex sterilis*, and *Silphium terebinthinaceum*.

Voucher specimen: **MISSOURI. Shannon Co.**: The Nature Conservancy's Shut-in Mountain Fens Preserve, along the S side of Shannon County H-522, ca. 1.4 mi NE of the jct of hwys H and NN, ca. 7.5 mi E of Eminence; from marly openings in westernmost fen, 37° 06' 24.33" N, 91° 14' 05.47" W, 30 Apr 2010, *Thomas 2343* (MO).

Figure 2. *Utricularia minor* at Shut-in Mountain Fens Preserve. Photograph by Justin Thomas.

Utricularia minor is a circumboreal species, concentrated in the conterminous United States in New England and the northern Great Lakes states, and occurring at scattered localities from the Dakotas and central Nebraska west to Washington, Oregon, and California (Neid 2006; BONAP 2012). This collection represents a significant range extension for this species. The nearest known locations for *U. minor* are two ponds in Saline and Clay counties, Illinois, where the species was collected in 1964 and 1965, respectively (Dolbeare and Ebinger 1974; Herkert and Ebinger, eds., 2002). These southern Illinois collections represent possible introductions or waifs (Herkert and Ebinger, eds., 2002); the species is otherwise concentrated in far northeastern Illinois and, to the west, occurs no closer to Missouri than north-central Iowa (BONAP 2012). The species is also disjunct in the southeastern United States in high-elevation fens and bogs in the Southern Blue Ridge Mountains in western North Carolina (Weakley 2011).

Throughout its range, *Utricularia minor* typically inhabits low-nutrient, anaerobic wetland habitats. In New England and the Great Lakes states, *U. minor* inhabits a variety of wetlands, including shallow ponds, peaty lake margins, fens, sedge meadows, and marshes, often in shallow water or disturbed areas such as tire ruts and animal trails (Voss 1996; Chadde 2002; Magee and Ahles 2007). The species generally shows a preference for calcareous soils (Voss 1996; Chadde 2002). In the western United States, the species is scattered and local, and typically occurs in seeps, floating mats, shallow water, and saturated peat in calcareous fens and associated habitats at elevations typically greater than 2,100 m (7,000 ft) (Neid 2006). In Alaska, *U. minor* is known from quiet water and mud habitats (Hultén 1968). Although *U. minor* is considered to be globally secure, the species is rare across much of its North American range, and it is considered critically imperiled in Illinois, Indiana, Iowa, New Jersey, Utah, and Prince Edward Island; imperiled in Colorado, Nebraska, New York, North Dakota, Oregon, Washington, Wyoming, New Brunswick, and Saskatchewan; and vulnerable in California, Ohio, and Manitoba. In addition, *U. minor* is considered extirpated from Delaware and is known only from historical collections from North Carolina and Rhode Island (Neid 2006).

The genus *Utricularia* L. is diverse worldwide, but only 20 species are documented from the United States and Canada, and only three species were previously documented from Missouri: *U. gibba* L.; *U. macrorhiza* J. Le Conte; and *U. subulata* L. (Steyermark 1963; Neid 2006; BONAP 2012). *Utricularia minor* can be differentiated from *U. subulata*, which also occurs at the site, by its numerous, dichotomous or irregularly divided leaves (vs. leaves absent or linear for *U. subulata*) and by its small, cream-colored flowers with the spur approximately half the length of the lower lip (vs. flowers yellow with the spur about equaling the lip in *U. subulata*) (Gleason and Cronquist 1991). *Utricularia minor* can be differentiated from *U. gibba* and *U. macrorhiza* by its lower corolla lip, which is approximately twice as long as the upper lip (vs. lower corolla lip equaling or slightly longer than the upper lip in *U. gibba* and *U. macrorhiza*) and its flat ultimate leaf segments (vs. ultimate leaf segments filiform in *U. gibba* and *U. macrorhiza*) (Gleason and Cronquist 1991).

Based on its occurrence in a typical habitat (calcareous fen), the rarity and local distribution of calcareous fens in southern Missouri (Nelson 2010), and the documentation of numerous scattered populations in similar wetlands in several western states over the past half-century (Neid 2006), the population of *Utricularia minor* at Shut-in Mountain Fens Preserve is likely a native occurrence. In addition, *U. minor* is a very small, inconspicuous, easily overlooked plant, and flowers early in spring when its calcareous fen habitat appears barren of vegetation without close inspection. Systematic inventories of calcareous fens, seeps, and pond shores in the surrounding region in April or early May may reveal additional populations of this locally rare bladderwort species in southern Missouri.

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